

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
1 September 2005 (01.09.2005)

PCT

(10) International Publication Number  
**WO 2005/080928 A1**

(51) International Patent Classification<sup>7</sup>: **G01H 9/00**

QinetiQ Limited, Malvern Technology Centre, St Andrews  
Road, Malvern, Worcestershire WR14 3PS (GB).

(21) International Application Number:  
PCT/GB2005/000422

(74) Agent: **DAVIES, Philip**; QinetiQ Ltd, IP Formalities,  
Cody Technology Park, A4 Building, Room G016, Ively  
Road, Farnborough, Hampshire GU14 0LX (GB).

(22) International Filing Date: 7 February 2005 (07.02.2005)

(25) Filing Language: English

(81) Designated States (*unless otherwise indicated, for every  
kind of national protection available*): AE, AG, AL, AM,  
AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,  
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,  
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,  
KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD,  
MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG,  
PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM,  
TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM,  
ZW.

(26) Publication Language: English

(30) Priority Data:  
0403468.2 17 February 2004 (17.02.2004) GB

(71) Applicant (*for all designated States except US*): **QINETIQ LIMITED** [GB/GB]; 85 Buckingham Gate, London  
SW1E 6PD (GB).

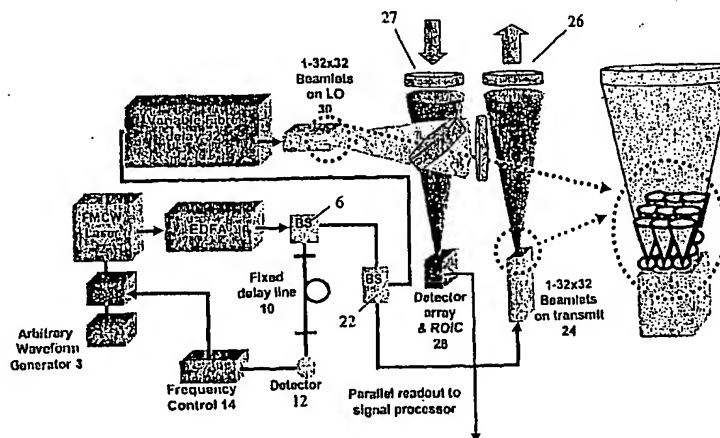
(72) Inventors; and

(75) Inventors/Applicants (*for US only*): **PEARSON, Guy,**  
Neville [GB/GB]; QinetiQ Limited, Malvern Technology  
Centre, St Andrews Road, Malvern, Worcestershire WR14  
3PS (GB). **WILLETTS, David,** Vedmore [GB/GB];

(84) Designated States (*unless otherwise indicated, for every  
kind of regional protection available*): ARIPO (BW, GH,  
GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM,  
ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),  
European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,  
FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO,

[Continued on next page]

(54) Title: **LASER VIBROMETER**



(57) Abstract: This invention relates a laser vibrometer. A frequency modulated laser source (2, 3) generates a frequency modulated output, preferably a linear ramp, which is used for both the transmit beam and the local oscillator signal. Transmit (26) and receive optics (27) transmit the transmit beam towards a target and receive radiation returned therefrom. The local oscillator is mixed with the received beam and the mixed signal detected by a detector array (28). Before mixing with the received radiation however the local oscillator is delayed for a time substantially the same as the flight time of the radiation, preferably through a variable optical delay (32). Delaying the local oscillator signal in this way means that the received radiation was generated at nearly the same time as the local oscillator signal with which it was mixed and both received the same modulation. Therefore any variations in modulation of the modulation of the source will be present in both the receive beam and local oscillator signal and will to a large extent cancel. The use of a delay also means that the detected intermediate frequency has a narrow bandwidth easing signal processing requirements and also as the local oscillator signal is in near coincidence with the received beam the effects of phase noise of the source are reduced.

WO 2005/080928 A1

BEST AVAILABLE COPY



SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

**Published:**

— *with international search report*

**Declaration under Rule 4.17:**

— *of inventorship (Rule 4.17(iv)) for US only*

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*